Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

V SEMESTER B.TECH. (CIVIL ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2016

SUBJECT: ADVANCED REINFORCED CONCRETE DESGN [CIE 4014]

REVISED CREDIT SYSTEM

(01/12/2016)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed
- Use of IS:456-2000, IS:3370-2009 and SP- 16 are permitted

<table>
<tr><td>1A.</td><td>Give the plan showing typical reinforcement detailing (top layer only) and. sectional elevation of column and middle strips of longer span of the interior panel of a flat slab (with drop and head) indicating different components of it clearly.
<table>
<tr><td></td><td></td><td>-ve reinforcement</td><td>+ve reinforcement</td></tr>
<tr><td rowspan="2">Longer span</td><td>Column strip</td><td>a</td><td>b</td></tr>
<tr><td>Middle strip</td><td>c</td><td>d</td></tr>
<tr><td rowspan="2">Shorter span</td><td>Column strip</td><td>e</td><td>f</td></tr>
<tr><td>Middle strip</td><td>g</td><td>h</td></tr>
<tr><td colspan="2">Distribution reinforcement (for all components)</td><td colspan="2">i</td></tr>
</table></td><td>06</td><td>CO2 & 3</td></tr>
<tr><td>1B.</td><td>Perform shear check for the interior panel of a flat slab with drop and column head.
Panel size: 6.2m X 7.2m
Drop size: 2.5m X 2.5m
Factored load on panel: 20kN/m^2
Diameter of column head: 1.3m
Overall thickness of slab and drop: 240mm and 80mm (adopt effective cover of 30mm) respectively
Grade of concrete: M30</td><td>04</td><td>CO2 & 3</td></tr>
<tr><td>2A.</td><td>The details of cantilever retaining wall is given below:
Height of earth retained: 5.2m
Depth of foundation provided: 1.5m
Density of soil: 16kN/m^3
Angle of repose and co-efficient of friction: 29° and 0.4 respectively
Safe bearing capacity of soil: 210kN/m^2
Uniform thickness of stem throughout height: 550mm
Width and thickness of base slab: 3.5m and 550mm respectively
Toe projection: 1.2m
Grade of concrete and steel: M25 and Fe500
Perform all the stability checks and design shear key, if needed. Calculate reinforcement required for stem.</td><td>10</td><td>CO2 & 3</td></tr>
</table>

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3A.	A rectangular open water tank has a clear dimension of (7m X 4m X 4.2m). Assuming effective initial thickness of tank wall as 220mm (adopt 50mm effective cover), design long wall using M40 grade concrete and Fe415 grade steel.	**10**	**CO2 & 3**
4A.	Analyze an RC grid floor of size (13.6mX17.0m) for bending moments and design grid beams for maximum bending moment (shear check is not required). Adopt plate theory for the analysis. Check for maximum deflection possible. Spacing of grid beams in mutually perpendicular directions = 1.7m *c/c* Thickness of slab = *130mm* Size of grid beams in both directions = (0.7mX 0.25m) Effective cover: 40mm Live and floor finish loads = 1.6kN/m^2 and *0.4N/m^2* respectively Torsional rigidity: 22.377 X 10^3 kNm Adopt M25 grade concrete and Fe415 grade steel.	**10**	**CO2 & 3**
5A.	Analyze a multistorey 3 bay structure for bending moments by substitute frame method using following data for a) DL and LL on first span and DL on second and third spans b) DL and LL on first and second spans and DL on third span Effective floor to floor height: 3.6m Spacing of beams in the direction perpendicular to the frame considered: 3.5m *c/c* Spacing of columns in the frame considered: 7m *c/c* Thickness of floor slab: 110mm Live and floor finish loads = *1.6kN/m^2* and *0.4kN/m^2* respectively Size of floor beams: 230mm X 300mm Size of columns: *230mm* X 400mm	**10**	**CO2 & 3**